**Complex gain predistortion in WCDMA power amplifiers with memory effects**


ABSTRACT

Power amplifiers are essential components in communication systems and are inherently nonlinear. The nonlinearity creates spectral growth beyond the signal bandwidth, which interferes with adjacent channels. It also causes distortions within the signal bandwidth, which decreases the bit error rate at the receiver. In digital predistortion system, an inverse characteristic of power amplifier is generated and its amplitude and phase are combined to the signal input. So the input signal is predistorted and the power amplifier response is corrected. This process has to be controlled at high accuracy to achieve a satisfactory compensation effect. The inverse characteristics are stored in a memory (look-up table) and this data are updated using an error that is produced by comparing the outputs of power amplifier with the input signals. In this paper a novel technique for compensating such effects is proposed. It is a combination of two techniques, memory polynomial predistortion and the gain based predistorter method. This method is compared with the other technique, memory polynomial method and validated using a 1.9 GHz 60W LDMOS power amplifier and various signals such as 2-carrier WCDMA with 10 MHz carrier spacing and 15 MHz bandwidth. Simulations and results show improvement in ACLR reduction and EVM with applying this method.



**Keyword:** Digital predistortion; Memory effects; ACLR; Power amplifier; WCDMA